



Armed Forces College of Medicine AFCM



Deglutition

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INTENDED LEARNING OBJECTIVES (ILO)



By the end of this lecture the student will be able to:

1. Mention the three phases of deglutition.
2. Describe the reflexes that protect food entry into respiratory passages during pharyngeal phase.
3. Describe the types of esophageal peristalsis .
4. Identify function of LES.
5. Mention the factors that affect tone of LES.
6. Describe cause and effects of gastro-esophageal reflux.



Lecture Plan



1. Part 1 (5 min) Introduction
2. Part 2 (35 min) Main lecture
3. Part 3 (5 min) Summary
4. Lecture Quiz (5 min)



Introduction



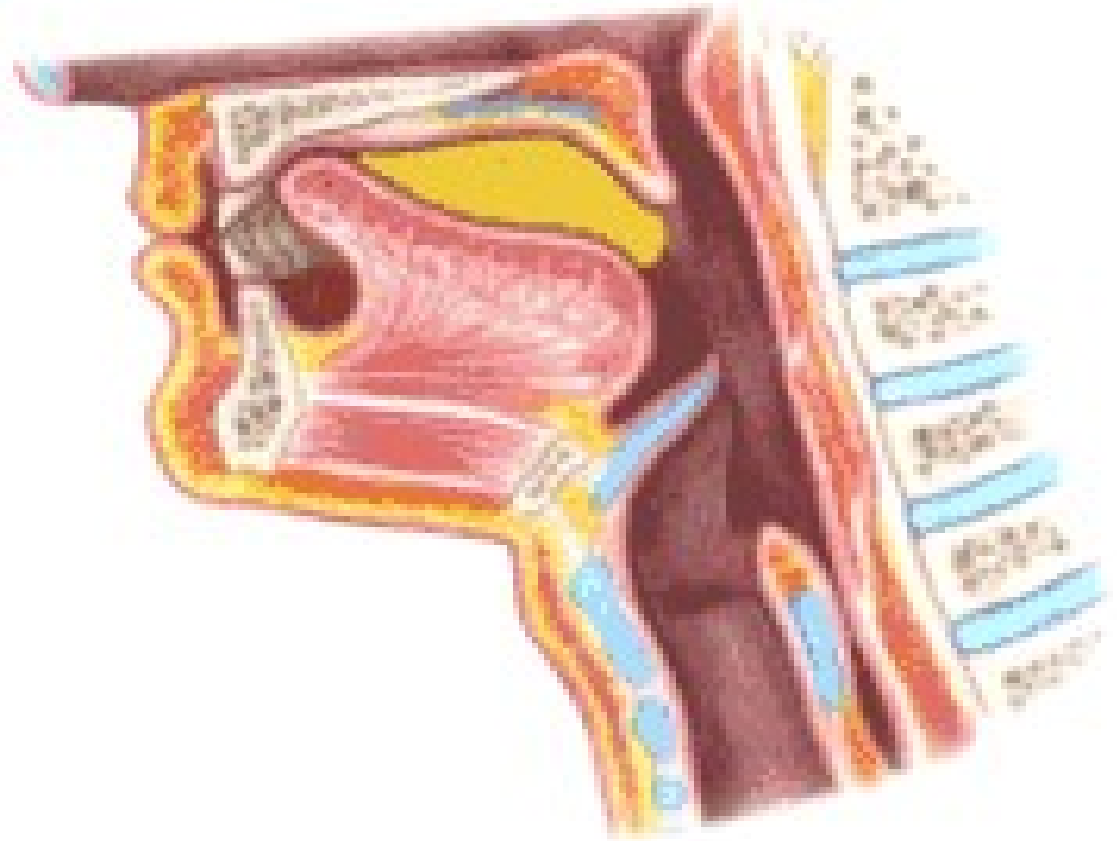
- Swallowing is initiated voluntarily when the movement of the tongue propels the food bolus to the rear of throat.
- Deglutition is the most complex reflex coordinated by deglutition centre in the medulla.
- The centre coordinates a group of activities that results in propulsion of food through pharynx and esophagus bypassing the respiratory passages.



Definition



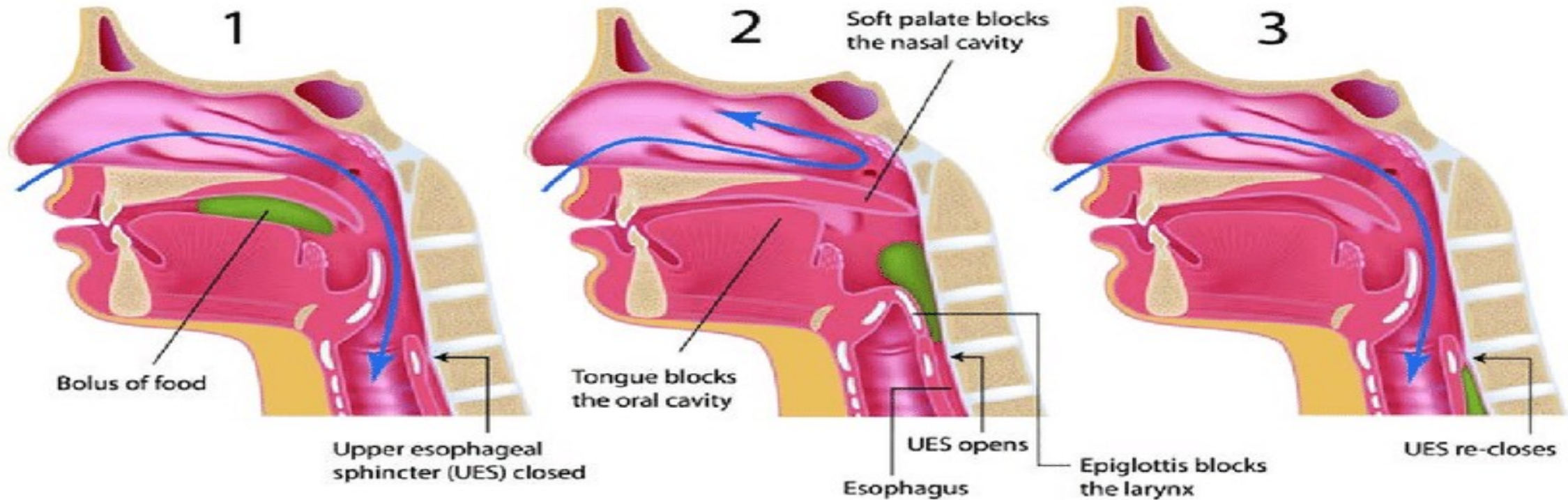
- **The process by which bolus of food moves from the mouth into the stomach.**



Stages of Swallowing



Swallowing



Oral stage

Pharyngeal stage

Esophageal stage



1) Oral Stage of Swallowing:

Voluntarily stage

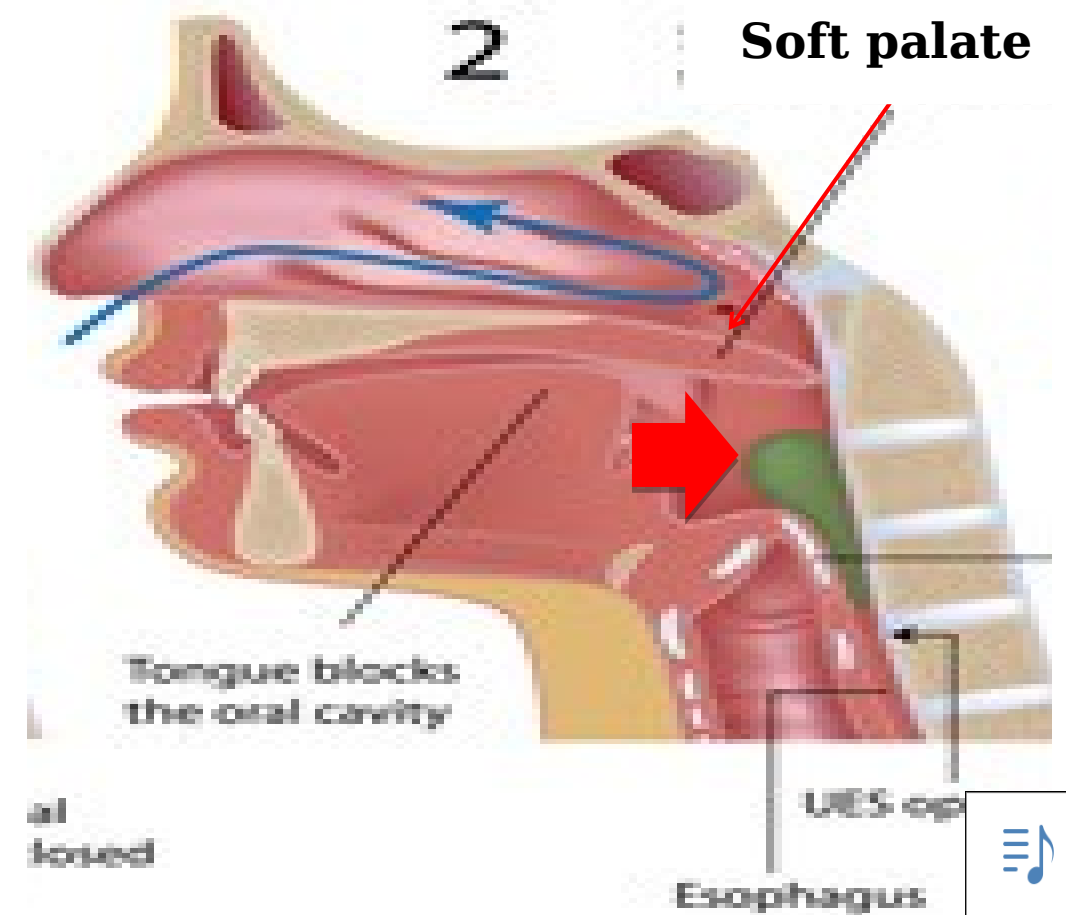
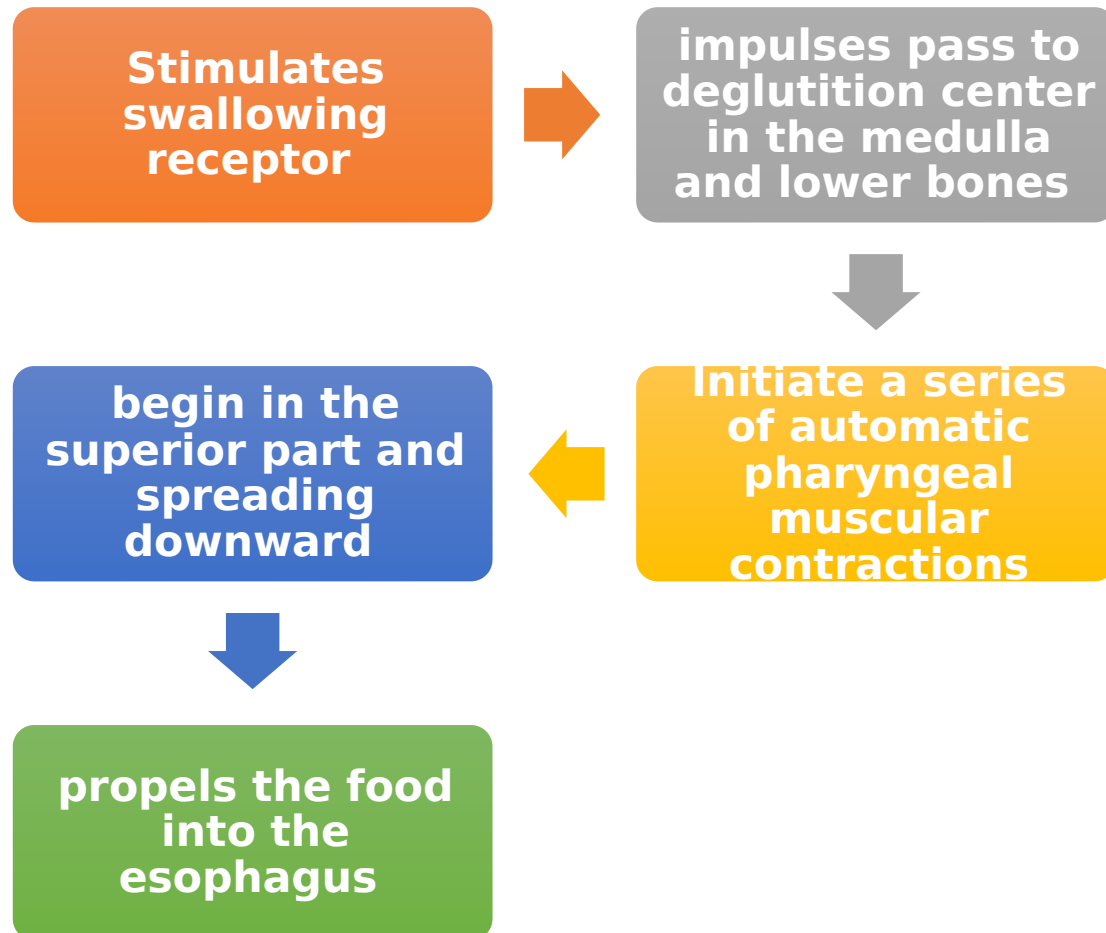


- The bolus is squeezed or rolled posteriorly into the pharynx by pressure of the tongue upward and backward against the hard palate by contraction of myelohyoid muscle.

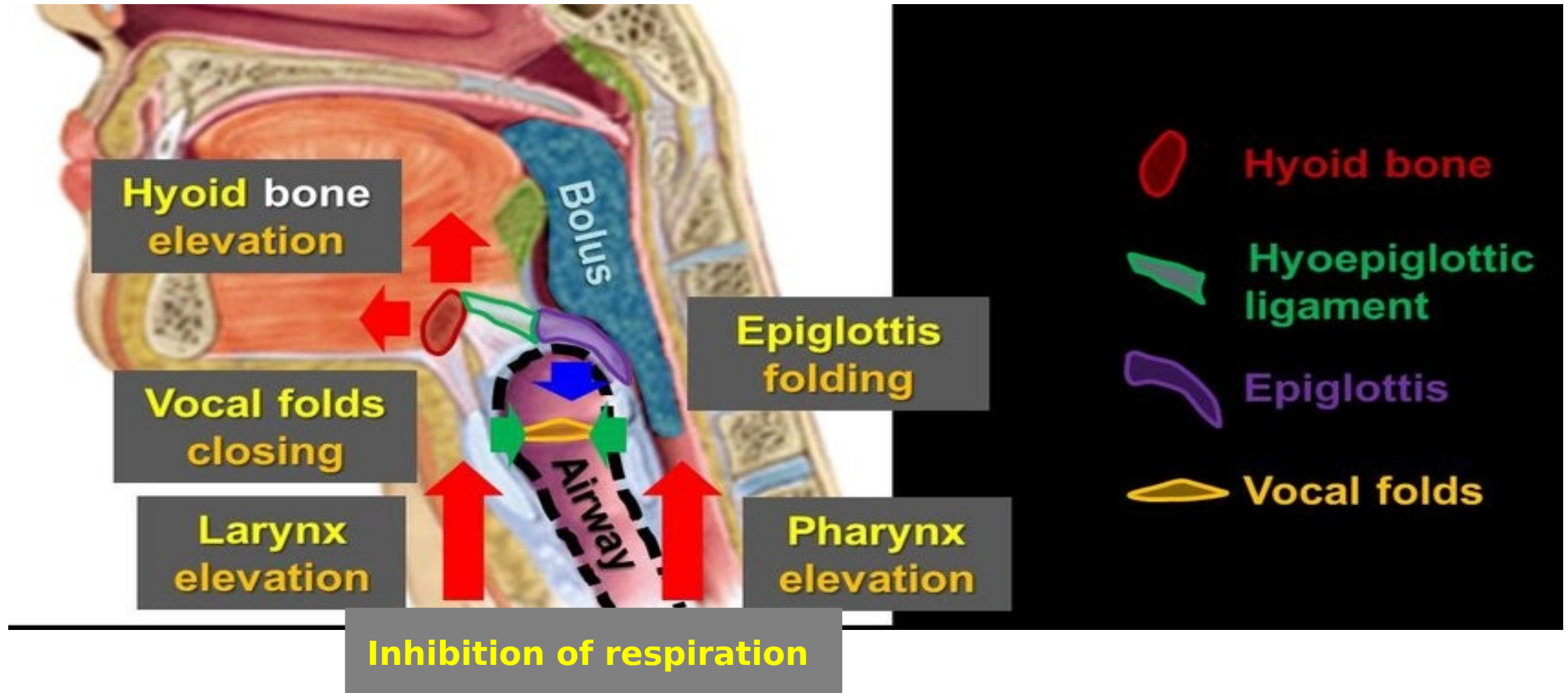


2) Pharyngeal Stage of Swallowing:

Involuntary stage Bolus of food enters the pharynx



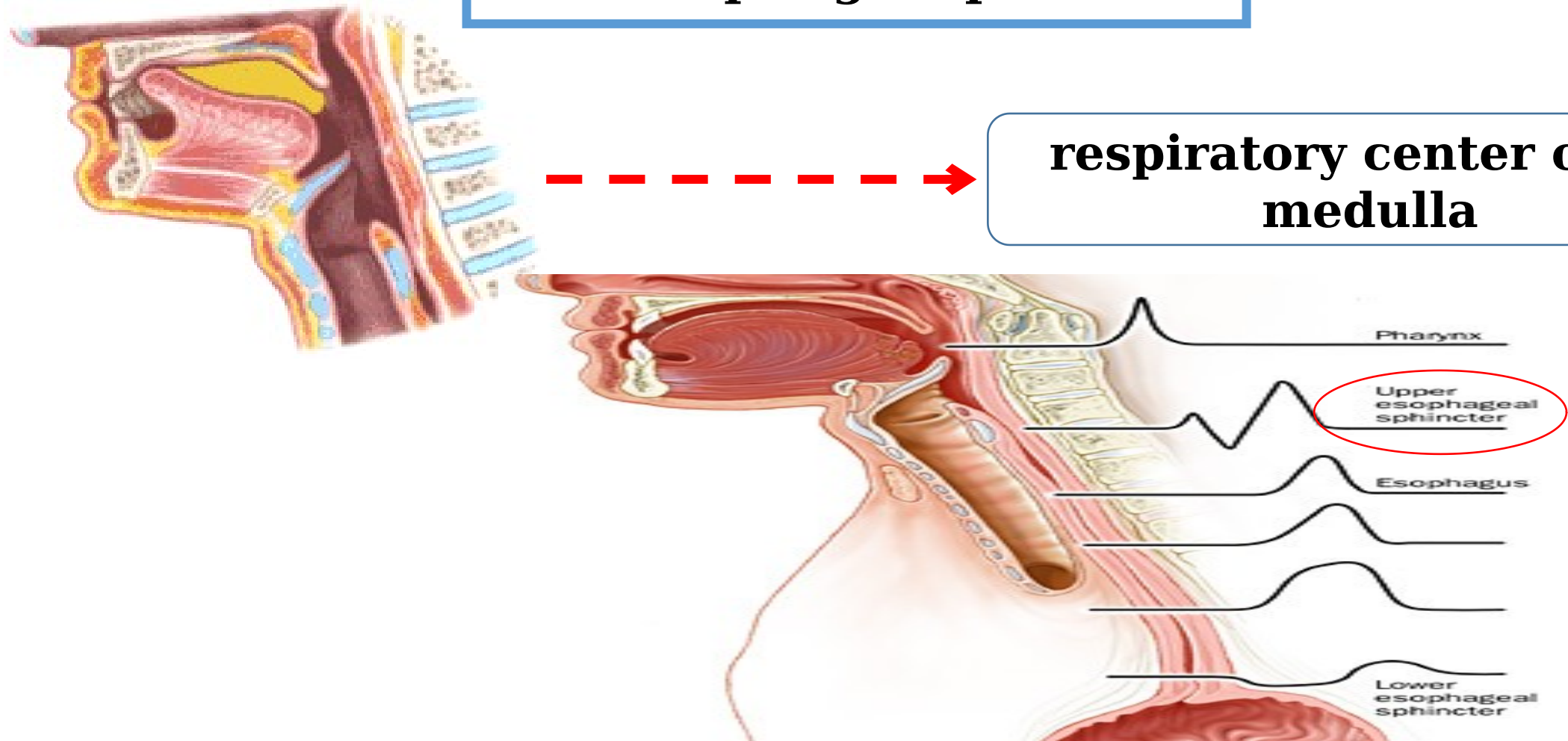
Protection of air passages during swallowing occurs as follow:



2) Pharyngeal Stage of Swallowing:

**1 to 2 seconds
interrupting respiration**

**respiratory center of the
medulla**



During swallowing:

(A) a bolus of food is voluntarily pushed backwards with the tongue in the pharyngeal phase.

(B) oesophageal peristalsis is a feature of the pharyngeal phase.

(C) reflex motor activity is coordinating by a centre in the hypothalamus.

(D) the laryngeal opening is protected by upwards movement of the larynx and passive deflection of the epiglottis in the pharyngeal phase.

(E) the soft palate prevents food from entering the nasal passages in the oral phase.

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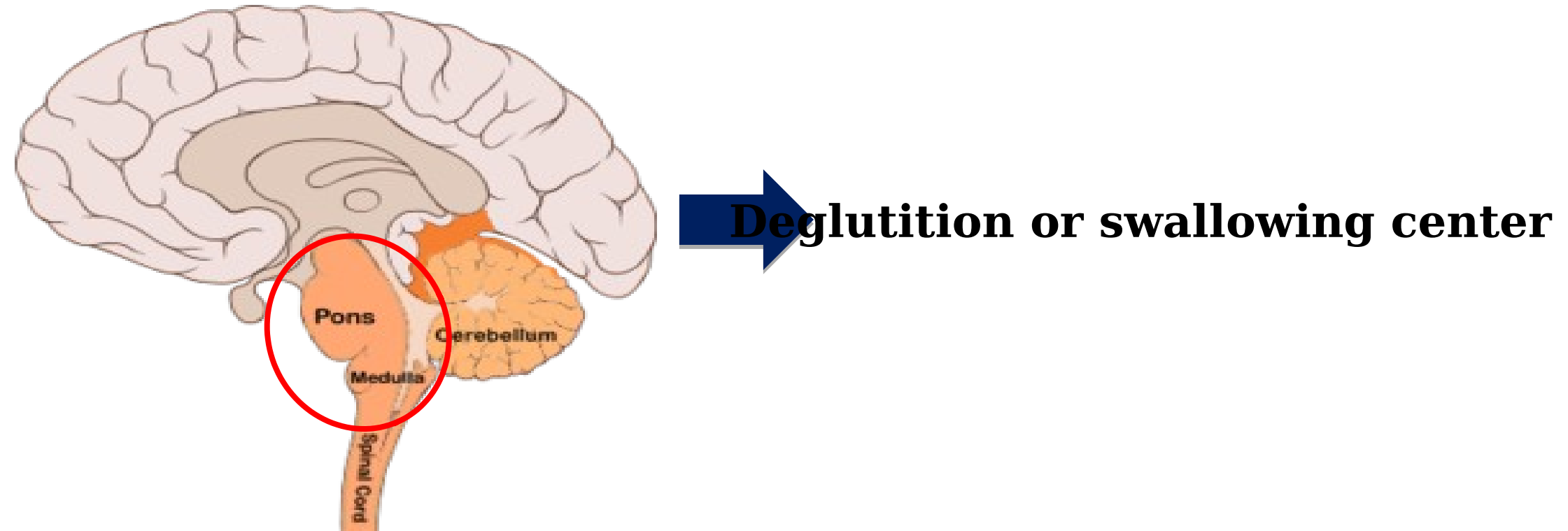
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Nervous Control of the Pharyngeal Stage of Swallowing



Pharyngeal stage

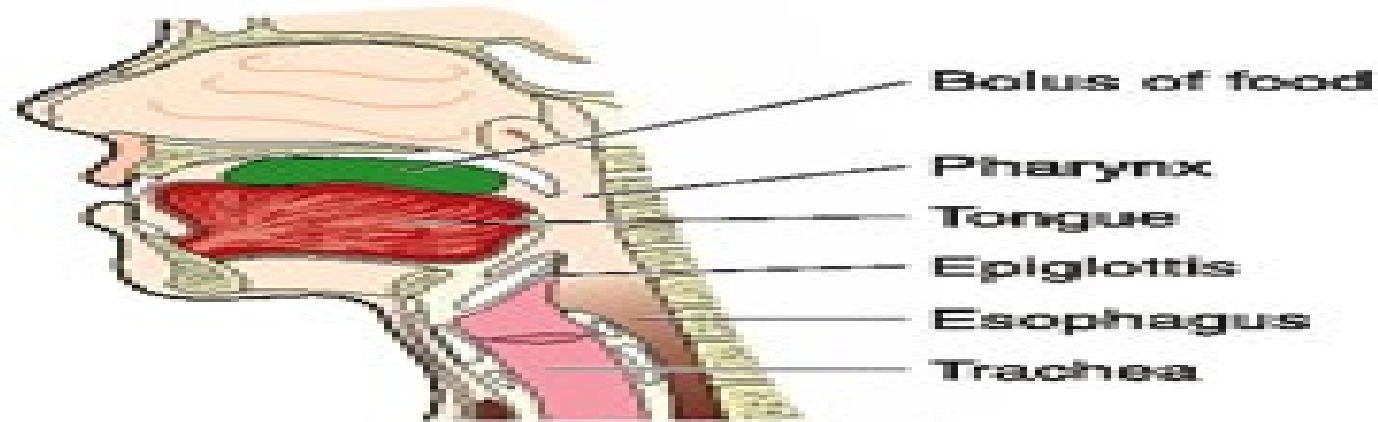


Reflex act



3) Esophageal Stage of Swallowing:

Involuntarily stage

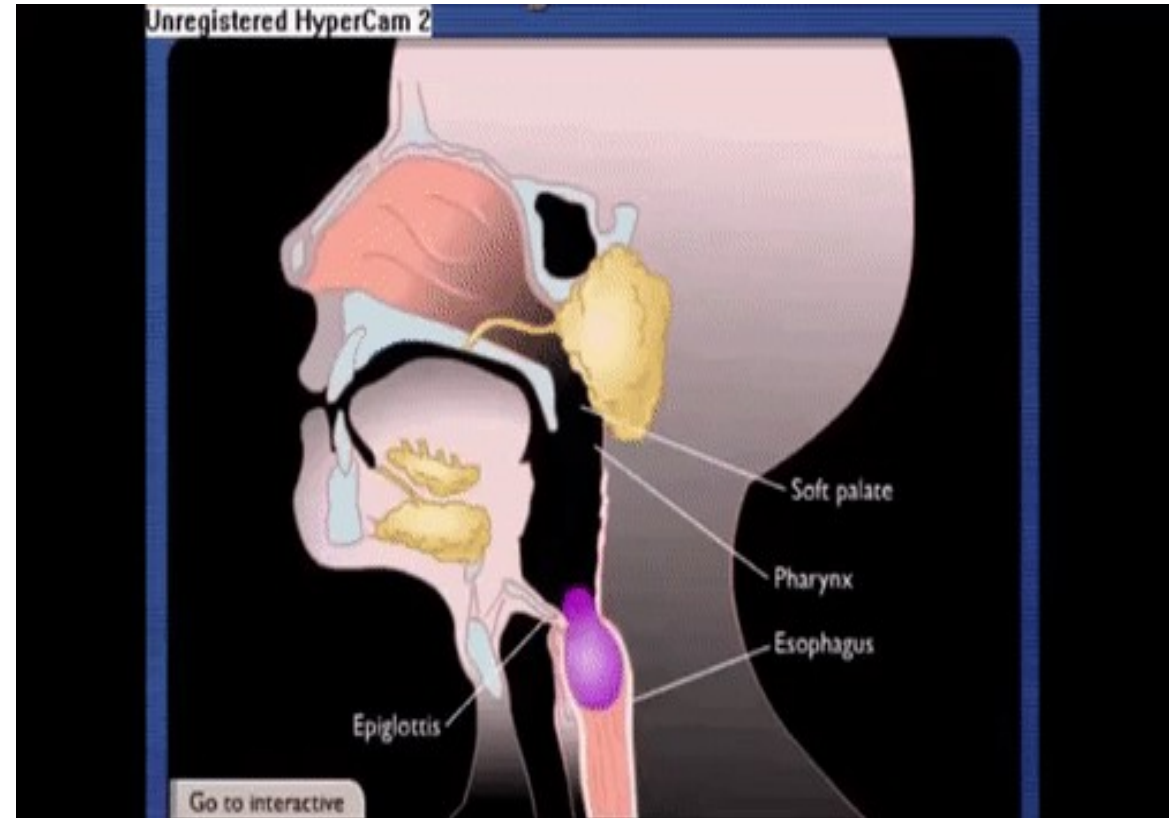


3)Esophageal Stage of Swallowing:

Esophagus peristaltic movements

Primary peristalsis

Secondary peristalsis

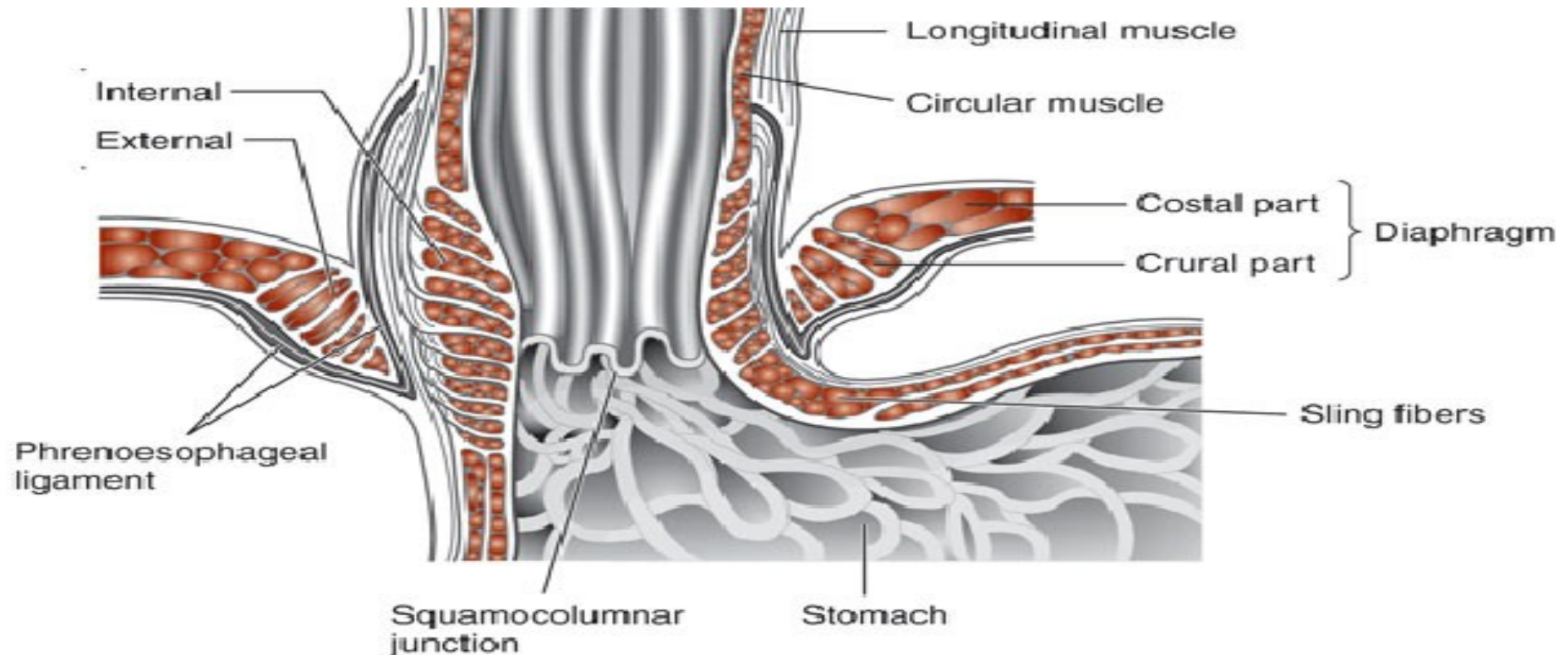


8 to 10 seconds



Function of Lower Oesophageal Sphincter (Gastro-esophageal Sphincter) (LES)

Components



Function of Lower Oesophageal Sphincter (Gastro- oesophageal Sphincter) (LES)

Function



Receptive relaxation



Lower Oesophageal Sphincter (Gastro-esophageal :Sphincter) (LES)

The tone of the LES is under neural control

Acetylcholine
Excitatory

**Nitric oxide (NO) and
VIP**
Inhibitory

Between meals the normal tonic activity of the lower esophageal sphincter prevents reflux of stomach contents into the esophagus.



Abnormalities of the tone of LES

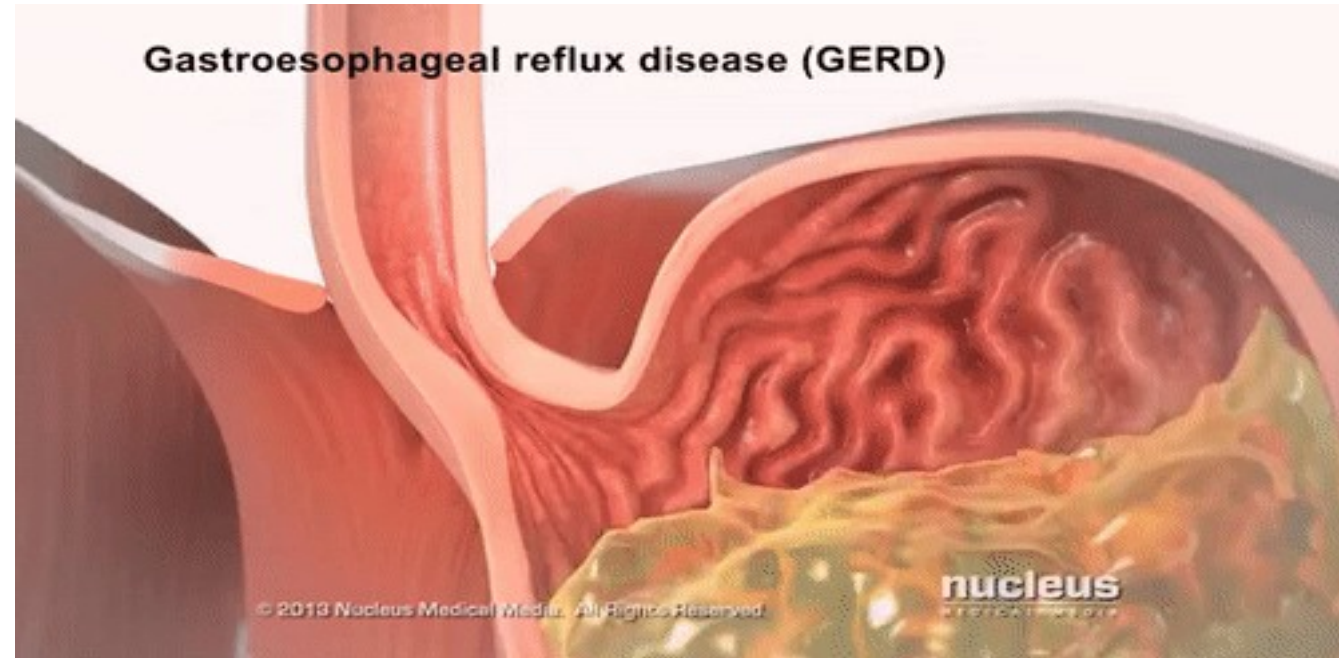
1 Gastroesophageal Reflux

↓ Resting tone of LES

↻ During pregnancy

↑ high level of progesterone

Diet with high sugar and fat



Ulceration
of
esophagus

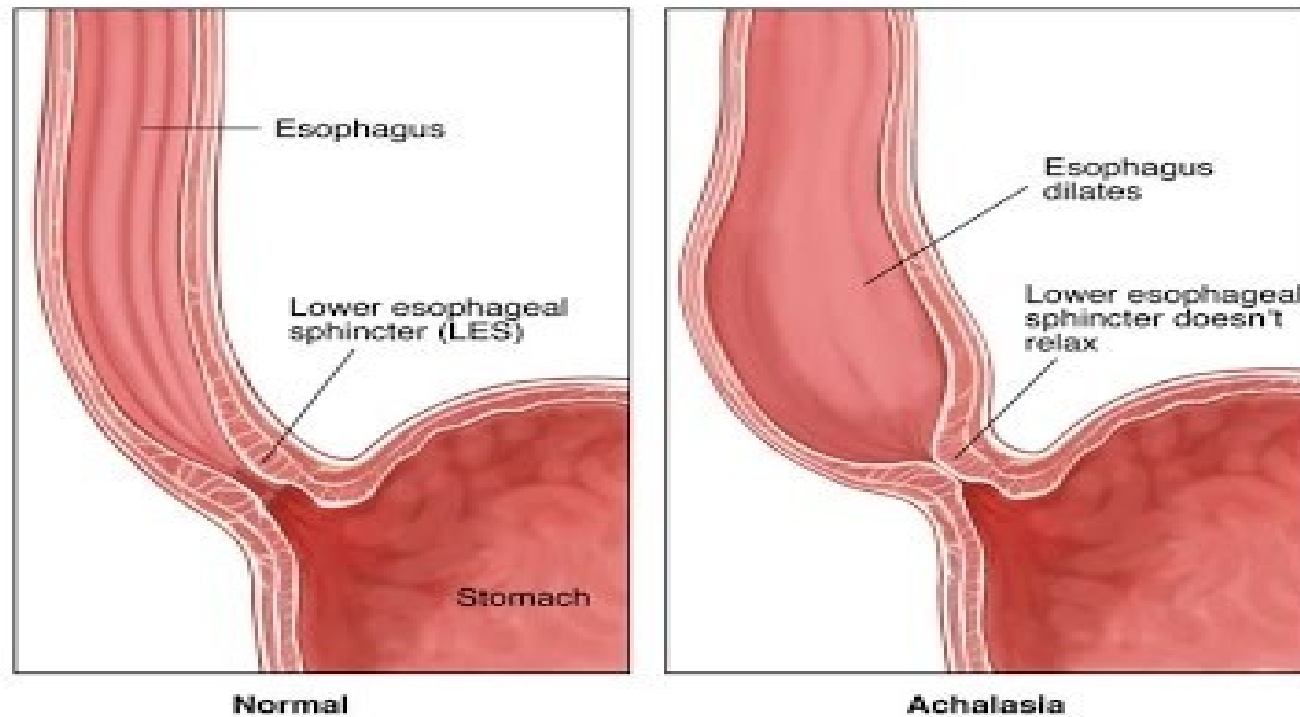
Stricture
of
esophagus

Heartburn



Abnormalities of the tone of LES

2 Achalasia:

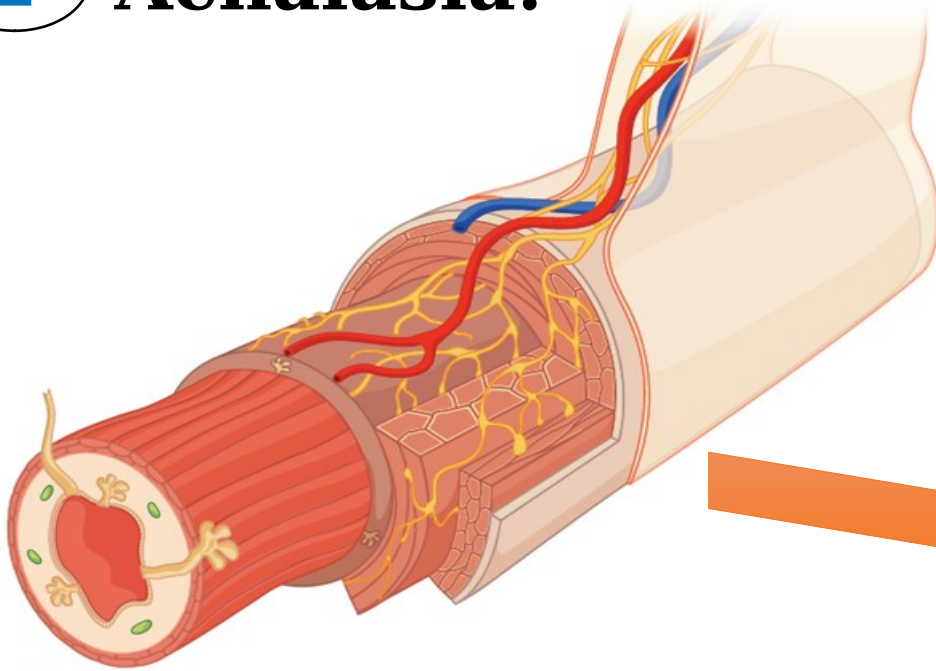


Esophageal Achalasia



Abnormalities of the tone of LES

2 Achalasia:



Defect at the LES (enteric nervous system)

Defective release of NO and VIP

•Dilation of the sphincter.

•Esophageal muscle incision.

•Injection of botulinum toxin in the LES to inhibit acetylcholine release.

Treatment



Summary

- Swallowing is initiated voluntary in mouth, thereafter it is under involuntary or reflex control.
- The reflex is coordinated by swallowing center in the medulla.
- The UES and LES are closed and open only during swallowing.
- Swallowing ends by entry of the bolus of food into the stomach.





Question 1

when there is no peristaltic contraction of lower half of the body of the oesophagus and failure of LES to relax on swallowing, there is a defect in which of the following?

- a) Medulla oblongata.
- b) Vagus nerve.
- c) Enteric nervous system.
- d) Smooth muscle of oesophagus.
- e) Striated muscle of oesophagus.





Question 2

Which of the following is the major stimulus for primary peristalsis in the oesophagus?

- a) Presence of food in oesophagus.
- b) Swallowing.
- c) Regurgitation of food from stomach.
- d) Closure of UES.
- e) Opening of LES.





Question 3

achalasia of the cardia is due to defect in which of the following?

- a) Medulla oblongata.
- b) Vagus nerve.
- c) Enteric nervous system.
- d) Smooth muscle of lower 2/3 of the oesophagus.
- e) Skeletal muscles of upper 1/3 of the oesophagus.



SUGGESTED TEXTBOOKS



1. Medical physiology 11th edition, Guyton & Hall

From page 781 to 782.

2. Ganong's Review of Medical Physiology, 25th edition

From page 497 to 498.

